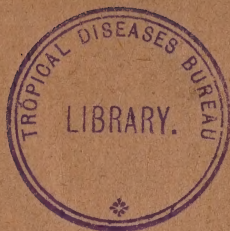


THE TREATMENT OF  
MALARIA.

BY  
J. CLAUDE PAINE, M. D.,  
Peoria, Ill.

Attending Physician to the St. Francis  
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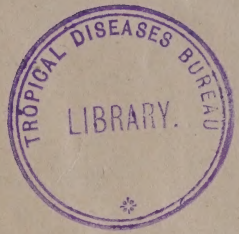


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# THE TREATMENT OF MALARIA.

By J. CLAUDE PAINE, M. D.

PEORIA, ILL.

ATTENDING PHYSICIAN TO THE ST. FRANCIS  
HOSPITAL.

## PROPHYLAXIS.

(a) *General Prophylaxis:* The first thing to consider under prophylaxis is the destruction of the breeding grounds of the mosquito. The favorite breeding ground of this insect is to be found in low, swampy land with stagnant pools of water and a rank growth of weeds. In all cases where it is possible such land should be properly tiled and drained. Low ground of not too great extent may be filled in with dirt. If it proves impossible either to drain or fill in the land, the next best thing to do would be to have petroleum, light fuel oil, or kerosene poured on all stagnant pools, using about half a pint of oil to each one hundred square feet of surface to be covered. This should be done in the spring before the larvae have developed into mosquitoes and as the oil evaporates in time, it should be renewed two or three times during the summer. The oil forms a thin coating over the surface of the water and destroys the female mosquitoes when they deposit their eggs and also prevents the larvae from obtaining air and destroys them as they rise to the surface of the water. Stagnant pools and streams may also be stocked with fish which feed with avidity on the larvae.



Rank vegetation must at all times be kept cut down as otherwise it also affords protection to the mosquito. Rapid growing trees, such as the Eucalyptus, Pine, etc., may be planted in low marshy places and do much good in changing such a place from a good breeding ground for the mosquito, by both absorbing moisture from the ground and humidity from the air. For the destruction of mosquitoes in buildings, homes and cellars nothing but a thorough fumigation with sulphur or formaldehyde will suffice. Mosquitoes will live in a warm cellar all winter and this probably helps to explain how it is possible to have a typical malarial attack in midwinter. The author is one of those who do not believe that *all cases* are caused by a bite from the Anopheles mosquito, but that it may occasionally be conveyed by flies and other insects and by bad drinking water.

(b) *Individual Prophylaxis*: People residing in malarial districts should endeavor to have their homes as far away from the river, lake or swamp as possible and on the most elevated land. Houses should have all doors and windows double screened with fine meshed screening. Wells, cisterns and cess pools must also be kept carefully screened as they otherwise form an excellent breeding place for the mosquito. Cans, buckets, barrels, tubs, etc., partially filled with water, should not be allowed to remain around the premises, as they likewise form breeding places for this insect. A person subject to the disease should remain in the house from sunset until sunrise.

(as mosquitoes are more numerous during these hours and infection therefore more likely.) They should preferably sleep in a room in the upper floor of the house and in a bed well covered by mosquito netting. These precautions should be rigidly observed during the summer months. Patients suffering from malaria should preferably be kept in a bed well covered by mosquito netting, not only to prevent re-infection but also to prevent being a source of infection to other people by mosquitoes first biting them and afterwards transferring the disease to others. All water used for drinking purposes should be boiled, especially if derived from a river or cistern. A small dose of quinine, say two or three grains, taken three times a day serves as an excellent preventative during the malarial season. If these measures fail to keep a person free from the disease, a change of climate is imperatively indicated.

#### GENERAL TREATMENT.

*Intermittent Malarial Fever:* Three types of this form of the disease are encountered, *First*, the Tertian: In this type the plasmodium has a cycle of development of 48 hours and the chills therefore recur every other day. *Second*, a double infection with the Tertian parasite is very frequent, producing the quotidian type of the disease, the chills recurring every day, and *Third*, the Quartan, which is a comparatively rare type, the plasmodium having a cycle of development of 72 hours and the chills therefore recurring every third day.

*Treatment of the Paroxysm:* If the physician arrives before the chill has occurred, a hypodermic injection of  $\frac{1}{4}$  of a grain of morphine sulphate and 1-150 of a grain of atropine sulphate will markedly modify the severity of the chill. During the *chill itself*, the patient may be placed in bed, bundled up in warm blankets, given hot drinks, such as hot lemonade or whiskey, and have hot water bottles applied to the extremities. The chill soon passes off, however, and is replaced by a *burning fever*, which may last several hours and is best treated by tepid sponge baths, ice bag to the head, cool drinks and small doses of phenacetin or acetanilid, three or four grains of the former or two grains of the latter every two hours. Finally the fever passes away and the patient becomes bathed in a profuse perspiration which constitutes the *sweating stage*. All that it is necessary to do now is to change the under garments and clothe the patient with dry garments.

*Curative Treatment:* In all cases, unless the bowels happen to be very loose, small doses of calomel and soda, say  $\frac{1}{4}$  grain of the former and 1 grain of the latter, should be taken every hour for eight or ten doses and if the bowels do not move freely by the next morning, follow it up with a Seidlitz Powder, glass of Hunyadi Water or a dose of magnesium sulphate taken one hour before breakfast. A good many drugs have been at various times recommended in the treatment of malarial fevers; of these the derivatives of Cinchona Bark hold first place. Quinine or its salts, the



sulphate, bi-sulphate, hydrobromide and hydrochloride are probably most frequently used but Quinidine, Cinchonine and Cinchonidine are also very valuable at times in the treatment. The daily dose of quinine and its salts necessary to break up an attack of intermittent fever in an adult will vary from 20 to 30 grains in 24 hours. Twenty grains a day, however, usually suffices. Quinidine, cinchonine and cinchonidine require a larger dose to produce the same effect, about 1-3 larger than the dose of the quinine salts, and a daily dose of 30 grains.

*Administration of Quinine:* (i) *By Mouth:* This is the common mode of administering the drug. It may be given in solution, such as, quinine sulphate 1 dram, Acid Sulphuric dilute 1 dram and Syrup of Orange q. s. ad 4 ounces; Dose, 1 dram in water every two hours. This is, however, a nauseous, disagreeable mixture. Quinine should *always be given in capsules where it is possible* and the hydrobromide and hydrochloride being the most soluble and containing the largest percentage of quinine should have the preference. The bi-sulphate is also a valuable salt, although it is more irritating to the gastric mucosa than the above mentioned salts and not containing as much quinine requires that it be given in a larger dose. Quinine and quinine sulphate may also be given suspended in heavy syrups, such as Syrups of Chocolate, Yerba Santa or Licorice, 2 grains to each dram of the syrup. If pills or tablets of the drug are used they should be freshly prepared, as when old

they may be almost insoluble and therefore void of therapeutic action. If the sulphate of quinine is used, a good plan is to give 4 or 5 drops of dilute hydrochloric acid in water after each dose, to aid its solution. Twenty grains administered during the 24 hours usually suffices to abort an attack. However, some cases require larger doses and in tropical countries a daily dose of from 40 to 60 grains is frequently necessary. It has appeared to me that  $\frac{1}{4}$  to  $\frac{1}{2}$  of a grain of powdered capsicum, or 1 or 2 grains of powdered ginger added to each dose, has markedly aided its therapeutic action. In the administration of the drug it will be found a good plan to give small doses of two or three grains every two hours after the fever has subsided, *but for several hours before the next chill is due to give full doses of the drug, say four or five grains every hour for three or four doses, so that the system will be thoroughly charged with the drug at least two hours before the chill is due,* for the plasmodium is most susceptible to destruction at the time of sporulation.

(2) *By Hypodermic Injection:* (a) *Intramuscular Injection.* This method affords one of our best means of combating a severe or malignant type of the disease. The injection should be made with a good sized hypodermic syringe holding 1 or 2 drams, which should be thoroughly sterilized by boiling before using. The skin over the part to be injected should be carefully cleansed, first with soap and warm water and afterwards with alcohol. The site of injection should prefer-

ably be the gluteal region (buttocks) and the injection made deep or *intramuscular* and *not subcutaneous*. As a rule injections should not be repeated more often than twice a day, however in severe and pernicious forms of the disease it may be necessary to give them several times a day. If given in the intermittent form with chills, injections are best given two hours before the chill is due. A new spot should be chosen for each injection and the part gently massaged afterwards to promote the absorption of the drug. The salts of quinine most suitable for hypodermic use are the hydrobromide, hydrochloride, dihydrochloride, bi-muriate with urea and the bi-sulphate, as these are the most soluble. The following formulas are to be recommended for hypodermic use:

R

Quinine Hydrobromide

.50 to 1.00 (7½ to 15 grs.);

Alcohol .....1.00 (15 minims);

Glycerine .....1.00 (15 minims);

Aquae (warm sterile)

q. s. ad.....4.00 (1 drachm).

M.

Signa: To be used at one injection.

Or

R

Quinine Hydro-

chloride .... .65 (10 grs.);

Alcohol .....1.00 (15 minims);

Glycerine .....1.00 (15 minims);

Aquae (warm sterile)

q. s. ad.....4.00 (1 drachm).

M.

Signa: To be used at one injection.



(In preparing these solutions, dissolve the quinine in 95% alcohol *first*, then add the glycerine and water quantity sufficient to make 1 dram. They should be perfectly clear before using.)

(b) *Intravenous Injection.* This method has been used by some observers and of course impresses the system somewhat more rapidly than the intramuscular injections but owing to the increased difficulties of using and the increased risk, it should seldom be resorted to.

(3) *By Hypodermoclysis:* This method has been much commended by a number of physicians, especially in types of the disease in which subcutaneous injections of normal salt solution are also indicated. From 10 to 20 grains of the hydrochloride or hydrobromide of quinine should be dissolved in 1 pint of warm normal salt solution and injected with all antiseptic precautions in the loose subcutaneous tissue under the breasts. An ordinary fountain syringe, previously sterilized by boiling, with tubing and large needles will suffice. The quinine being well diluted does not seem to create the irritation to the subcutaneous tissues that concentrated solutions do.

(4) *By Rectum:* (a) *Rectal Enemata.* These may be used in cases in which the patient is unable to retain medicine by mouth. Quinine sulphate in doses of  $\frac{1}{2}$  a dram may be used, first adding sufficient tartaric acid to the warm water to dissolve the same, or a like amount of the hydrobromide may be first dissolved in alcohol and added to a couple of ounces of starch water and injected. The rec-

tum should first be emptied by an enema of warm water and castile soap before using the quinine enema. If rectal irritability exists and the enema is not retained, 5 or 10 minims of tincture opium may be added or better yet, precede the enema by inserting half an hour before use a suppository containing either 1 grain of opium,  $\frac{1}{2}$  a grain of extract belladonna or  $\frac{1}{4}$  of a grain of cocaine hydrochloride or a combination of these drugs. Enemata should not be repeated more often than twice in 24 hours.

(b) *Rectal Suppository.* This is a valuable adjuvant, especially useful in malaria in infants and children. Four or five grains of quinine hydrobromide may be incorporated in cacao butter and inserted in the rectum night and morning. If not retained a small amount of extract of belladonna,  $\frac{1}{8}$  to 1-12 of a grain, may be added to the suppository. Some physicians use plain gelatine capsules containing 2 to 4 grains of quinine sulphate or hydrobromide. They apply a little vaseline to them, insert them and instruct the mother to keep the buttocks pressed together for half an hour afterwards.

(5) *By Inunction:* This method is useful only in babies and small children but may be of use where they fail to retain quinine by mouth. One-half to one dram of quinine sulphate may be rubbed up with half an ounce of *each* lanolin and petrolatum, and the child given an inunction of one-half to one dram of the same over the abdomen or back night and morning. The inunction should be preceded



by a thorough cleansing of the skin and the rubbing continued for 15 to 20 minutes.

OTHER DERIVATIVES OF CINCHONA AND OTHER  
DRUGS IN THE TREATMENT OF MALARIA.

(1) *Cinchonidine sulphate* and *hydrochloride* are very useful and may be used in cases where quinine fails, in daily doses of 30 grains for an adult, also *cinchonine sulphate* and *muriate* may be used in the same doses. The same steps should be taken to saturate the patient with the drug a few hours before the expected chill. *Quinidine*, though not so valuable, has the advantage of not being so bitter and may be given in the same doses as the above drugs.

(2) *Salicin*, a preparation derived from willow bark, I have found next to cinchona the best drug in the treatment of intermittent fever. It should be given in capsules of 4 or 5 grains each and the daily dose should be from 30 to 40 grains for an adult, one capsule being taken every two hours. It is especially valuable in cases having an idiosyncrasy to quinine, some people being absolutely unable to take that drug without developing an intense fullness in the head, ringing in the ears, skin eruptions and even delirium and mania.

(3) *Methylene Blue* has been much vaunted in late years as a specific in malaria and has been extensively used in Italy and Greece, with favorable results in intermittents. It is, however, necessary to give the drug for several days. The dose is two grains in capsule every three hours for an adult, a daily dose of



from 10 to 12 grains. A small quantity of powdered nutmeg, say  $\frac{1}{2}$  of a grain, may be added to each dose. Though not as efficacious as quinine, it may be given to people that cannot take quinine. Some clinicians like a combination of two grains each methylene blue and quinine sulphate in capsule, every three hours better than either drug alone. Methylene blue, however, has the disadvantage of upsetting the stomach very readily.

(4) *Warburg's Tincture*. This preparation which, however, contains quinine, has had quite a reputation in malarial fevers, especially in cases resisting quinine. The dose should be from 2 to 4 drams every three hours and as it a very nauseous mixture to take, should preferably be prescribed in elastic gelatin capsules put up by several pharmaceutical houses. The elastic gelatin capsules are made in two sizes, one dram and two drams, both with and without aloes. The preparation without aloes is probably best in most cases, as that with aloes has a strong purgative effect and may move the bowels too freely.

(5) *Arsenic*. This drug has been used for years in malaria, particularly in chronic forms of the disease in which it, with Warburg's Tincture constitutes our best method of curing. It is also useful in post-malarial anemias in small doses, 1-20 of a grain of arsenous acid or 5 minims of Fowler's solution in water three times a day. In chronic forms of malaria it is probably best prescribed in the form of Fowler's solution, starting the patient (if an adult) with five drops taken in

half a glass of water after meals three times a day and increasing one drop a day until the patient is taking 10, 15 or even 20 drops three times a day or until the fever is broken. The dose must be reduced if the toxic effects are noticeable, such as puffiness of the eyes, itching of the eyelids, cramps in the stomach, diarrhea, etc., and the drug must be continued until the temperature has been normal for some time.

(6) *Opium*. This drug was used for malarial fevers years before quinine was discovered and often with very good results. In India it is much used as an adjuvant to quinine with which it is combined. The daily dose should not exceed 3 or 4 grains for an adult. A favorite combination with some physicians is one containing  $\frac{1}{4}$  to  $\frac{1}{2}$  of a grain of *each* powdered Opium and Capsicum and 2 or 3 grains of quinine, to each capsule.

(7) *Eucalyptus* is valuable at times and especially as an adjuvant to quinine. It may be prescribed in the form of the oil in doses of 5 to 10 drops every three hours but preferably in the form of the powdered extract of eucalyptus, the dose being 3 to 5 grains in capsule, every two, three or four hours.

#### THE TREATMENT OF AN AVERAGE CASE.

Have your patient put to bed, if not already there. Put him on a liquid diet. If in the febrile state, have him given sponge baths every two hours, ice bag to the head, cool drinks, cracked ice and if necessary to control the fever and headache give three grain doses of

phenacetin every two hours. Start him in immediately with  $\frac{1}{4}$  or  $\frac{1}{2}$  grain doses of calomel and soda every hour until two or three grains have been taken and follow with a saline laxative the next morning one hour before breakfast, if the bowels do not move freely. After his fever has somewhat subsided, one of the following capsules may be given:

R Quininae Hydrobromidi .....4.00 (1 dram);  
 Capsici ..... .30 (5 grs.);  
 Carbo Ligni ..... .30 (5 grs.).

M. et ft. Capsuli, No. 20.

Signa: One capsule every 2 hours.

or the following:

R Quinine Hydrochloridi .....4.00 (1 dram);  
 Capsici ..... .30 (5 grs.);  
 Hydrastin ..... .30 (5 grs.).  
 Ext. Eucalypti .....1.00 (15 grs.).

M. et ft. Capsuli, No. 20.

Signa: One capsule every 2 hours.

We will take for granted that his chills have been occurring every day at one o'clock p. m. Have him take one capsule at 6 o'clock p. m. the same day and repeat the dose at 8 o'clock and again at 10 o'clock p. m., and then stop for the night. We will have him start in at 7 o'clock the next morning and take two capsules for the first dose and one capsule every hour afterwards until 10 o'clock a. m., *then cease*. This will surcharge the system with 15 grains of quinine just before the chill, which will in nearly every instance be aborted. If there should be a recurrence of the chills or fever, the above method should be repeated, using somewhat larger doses. In some cases



the chill will be aborted but on taking the temperature the next day a degree or so of fever will be observed. In such cases it will be wise to use quinine in full doses until the temperature reaches, and remains, normal. I seldom have the drug administered during the night, only during the day, except in those cases where the chill occurs at such an hour as to render it necessary to do so.

*After Treatment.* After an attack of malaria the patient is more or less anemic, due to a destruction of the red blood corpuscles by the plasmodium. The longer that he has had the disease, the more pronounced the anemia and the probability of a recurrence of the chills. It has been my plan in all cases after the fever has been broken, to prescribe a moderate dose of quinine in combination with arsenic and iron to be taken by the patient for three or four weeks afterwards. This effectually prevents a relapse and at the same time builds the patient up again. A very valuable formula in my hands has been the following for such a use:

R Acidi Arsenosi ..... .06 (1 gr.);  
 Quininae sulphatis ..... 4.00 (1 dram);  
 Ferri carbonatis ..... 2.00 ( $\frac{1}{2}$  dram);  
 Ext. Nucis Vomicae..... .30 (5 grs.);  
 Ext. Eucalypti ..... 2.00 ( $\frac{1}{2}$  dram);  
 Ext. Taraxaci ..... 2.00 ( $\frac{1}{2}$  dram);

M. et ft. Capsuli, No. 30.

Signa: One capsule after meals 3 times a day.

The above formula, which is one of Dr. L. A. McFadden's of this city, has been used by him in malarial fevers for twenty years and in thousands of cases of this disease.

## THE TREATMENT IN INFANTS AND CHILDREN.

In young infants, say up to one year of age, after opening up the bowels with 1-10 grain doses of calomel and soda every hour and controlling the fever with sponging, ice bag to the head, etc., the best plan would be to give them an aqueous solution of the bisulphate of quinine. A prescription containing one grain of the bisulphate to one-half a dram *each* Aquae Purae and Aquae Cinnamomi, may be given. It should be borne in mind that it takes a relatively large dose to cure an infant, from 10 to 12 grains of the bisulphate in 24 hours or even more in some cases. If they reject the drug a rectal suppository containing 4 or 5 grains of quinine hydrobromide may be inserted night and morning and the mother instructed to keep the buttocks pressed together for half an hour afterwards. Inunctions of quinine with lanolin and petrolatum as described under the head of "Inunctions" may also be given twice a day. *After treatment* consists of preventing re-infection by keeping the baby's bed carefully covered by mosquito netting, etc., and the administration of 3 or 4 grains of quinine a day for one or two weeks, after the fever is broken.

*In older children* the bowels should be opened up with 1-10 grain doses of calomel and soda every hour until 1 or 2 grains have been taken or bowels have moved freely. It may be followed up with a Seidlitz Powder or the solution of the citrate of magnesia if necessary. The fever should be controlled by



tepid sponging every two hours, ice bag to the head, cool drinks, etc., during the febrile stage and the administration of 1 or 2 grain doses of phenacetin every two hours if necessary. In children from two years old and upwards it becomes necessary to disguise the drug as much as possible and to this end quinine sulphate 2 grains to the dram, may be prescribed suspended in Syrups of Chocolate, Yerba Santa, Licorice, etc. Children from four to ten years of age require from 14 to 16 grains of quinine in 24 hours to prevent the paroxysm. Quinine Chocolates, each containing one grain of the tannate of quinine form an excellent method of administering the drug. They are palatable and a child will usually eat 20 or 30 during the day. They are about 1-3 as strong as the sulphate of quinine. In severe forms of the disease hypodermics may be used as recommended under that heading but in smaller doses. In the rebellious and chronic cases Fowler's solution of arsenic should be given in ascending doses, well diluted with water after meals. A child five or ten years old should be started with 4 drops, taken 3 times a day and the dose gradually increased, at the same time 2 grain doses of quinine sulphate or cinchonidine sulphate may be given 4 times a day. *After treatment* consists of the prevention of re-infection by methods previously mentioned and the administration of a chill tonic, such as Liquor Potassium Arsenitis 1 dram, Ferrum Reductum  $\frac{1}{2}$  dram, Quinidine 1 dram and Syrup q. s. ad 4 ounces. Dose 1 dram, diluted after each meal. The



above mixture should be well shaken before taking and administered for 3 or 4 weeks.

#### LATENT AND MASKED FORMS OF MALARIA.

These may manifest themselves by malaise, gastric pains, headache and neuralgia (occurring at a certain hour every one, two or three days very often) and diarrheas and dysenteries. They should be met by full doses of quinine as previously described and, in addition, the patient given such other treatment as deemed necessary, as for the headache a powder composed of Phenacetin 4 grs., Caffeine Citrate 1 gr., Codeine Sulphate  $\frac{1}{4}$  gr., every two, three or four hours. For the neuralgia of malarial origin I have found the following a useful formula:

|   |                             |                 |
|---|-----------------------------|-----------------|
| R | Phenacetin .....            | 4.00 (1 dram);  |
|   | Quininae sulphatis .....    | 4.00 (1 dram);  |
|   | Codeinae sulphatis .....    | 1.00 (15 grs.); |
|   | Ext. Cannabis Indicae ..... | .30 (5 grs.);   |
|   | Ext. Aconiti .....          | .25 (4 grs.);   |

M. et ft. Capsuli, No. 30.

Signa: One capsule every two or three hours for an adult.

Wm. H. Thomson likes a combination of quinine and ergot or ergotin in malarial neuralgias.

#### REMITTENT AND CONTINUOUS MALARIA.

(Aestivo-autumnal Type.)

This form of the disease does not yield to treatment as readily as the intermittent form. The patient should be put to bed and kept there. The diet should be liquid. The fever

controlled with tepid sponge baths every two hours. Medical treatment consists of keeping the bowels freely open with small doses of calomel and soda followed by saline laxatives if necessary. Two or three grain doses of phenacetin every two hours, during the febrile stage, do good by assisting to control the fever and relieving the headache. Quinine should be given in daily doses of from 16 to 20 grains and a good plan will be found to combine it with an intestinal antiseptic. A capsule containing two grains *each*, of quinine hydrobromide and salol, or guaiacol carbonate, taken every two hours is a useful combination. An attempt may be made to convert the remittent fever into an intermittent fever by the hypodermic injection of  $\frac{1}{8}$  grain pilocarpine hydrochloride during the height of the fever. It may occasionally succeed but more often fails. Hypodermic injections of quinine salts may be resorted to if necessary. Warburg's Tincture in doses of two drams taken 4 or 5 times a day has proven useful in some cases, as has also the use of methylene blue alone or combined with salol, 2 grains of each taken in capsule every three hours. The nausea and vomiting are best controlled by cracked ice or bismuth subnitrate, cerium oxalate, carbolic acid, and cocaine hydrochloride in various combinations with a mustard plaster applied to the epigastrium. The after treatment consists of avoiding re-infection by the mosquito and taking a tonic composed of quinine, arsenic and iron three times a day for some weeks.



## REBELLIOUS TYPES OF MALARIA AND CHRONIC MALARIA.

Cases are occasionally encountered which resist almost every method of treatment. Wm. H. Thomson, in certain rebellious cases of Cuban malaria, treated by him, found the combination of quinine with aromatics and opium most useful. He administered 15 grains *each* of quinine sulphate and powdered ginger twice a day, also  $\frac{1}{2}$  ounce of paregoric twice a day, and cured most of his cases. Jacobi likes a combination of quinine and ergot in chronic cases and claims good results from his treatment. In obstinate forms of this disease, hypodermics of full doses of quinine (15 grains) two hours before the paroxysm and repeated once or twice in 24 hours, will be found most useful. This may be followed up by hypodermics every day for several days if necessary. Warburg's Tincture will also be found of much service in obstinate cases. It should be given in doses of 4 drams, four or five times a day. The Tincture without aloes should be used unless the patient is obstinately constipated. Combinations of Methylene Blue and quinine hydrobromide, 2 grains of each, in capsule may be taken every three hours. Arsenic in the form of Fowler's solution is our most valuable drug in chronic cases. An adult may be given 5 drops in half a glass of water three times a day after meals and the amount increased one drop a day until he is taking 10, 15, or even 20 drops three times a day. To make this method plain, the



patient takes 15 drops the first day, 16 drops the second day, 17 drops the third day, etc. If toxic symptoms appear, *cut down the dose*. In chronic cases, the author personally has had better results from a combination of Warburg's Tincture and arsenic. Have your patient take 2 drams of the Tincture without aloes (or with aloes if badly constipated) preferably in elastic gelatin capsules, four times a day and give him increasing doses of Fowler's solution of arsenic, starting in with 5 drops and increasing to 10, 15 or 20 drops three times a day, well diluted. Although this may not break the chills and fever immediately, I find that after a couple of weeks and the doses of the arsenic have become larger, that the fever is under control. It should be taken for some time after the temperature remains normal, then the patient given a combination of iron, arsenic and quinine (like the formula recommended previously in "After Treatment of Malaria") three times a day for some months. Physicians in malarial districts nearly all use quinine and arsenic conjointly in treating the chronic forms of the disease. In all chronic forms the patient must avoid fresh infection by remaining in the house from sunset until sunrise, boiling all drinking water and sleeping under mosquito netting. In all chronic cases *it is imperative that the elimination be maintained*.

Occasional courses of calomel and soda, 4 or 5 grains during the day, in divided doses, followed by a glass of Hunyadi, Apenta or half a glass of Pluto water the next morning.

Podophyllin in  $\frac{1}{4}$  to 1 grain doses is a very useful drug to act on the liver and keep the bowels open and may be given in tablet form at bedtime. Phosphate of soda, 1 or 2 drams in a glass of hot water, taken one hour before breakfast in the morning, is an excellent laxative. Occasional hot vapor or steam baths assist the elimination. For the enlarged spleen, ergot or ergotin has been recommended for internal use, also the iodides and syrup of the iodide of iron. Twenty drops of the fluid extract of ergot may be taken three times a day or 2 or 3 grains of ergotin (Bonjean) the same way. Locally, inunctions of compound iodine ointment and lanolin equal parts of each, or ichthyol ointment 1 dram to the ounce of lanolin, or red iodide of mercury ointment  $\frac{1}{2}$  to 1 dram to the ounce, may be tried night and morning. In all severe cases occurring in malarial districts a change of climate to some northern region that is free from the disease will markedly help in obtaining a complete cure.

#### PERNICIOUS MALARIA.

(1) *Algid Form.* In this form of the disease free stimulation is necessary. The patient may be given a hot tub bath with friction applied to the extremities and afterwards wrapped up in warm blankets and surrounded by hot water bottles. Hot saline solution should be given both subcutaneously and per rectum. Hot drinks may be administered, such as hot whiskey, tea, or lemonade, if possible to retain the same, and a free use of hy-



podermics of strychnia, atropine, camphorated oil, etc., and aromatic spirits of ammonia and compound spirits of ether by mouth. These cases call for the free administration of quinine by hypodermic injection, by saline infusion (subcutaneous or intravenous), per rectum, or by mouth for several days. *Give your patient a hypodermic injection of 30 grains of quinine hydrobromide and follow with hypodermics of 15 grains every 3 to 6 hours until the patient is improved.* Continue the quinine in full doses by mouth for several days. If the fever comes up keep an ice bag to the head. Hypodermics of morphine sulphate gr.  $\frac{1}{4}$ , and atropine sulphate gr. 1-150 may be used to quiet the patient and relieve the vomiting and purging when present. Rectal feeding by nutritive enemas of Malted Milk or Liquid Beef Peptonoids in normal salt solution should be resorted to later if necessary. *After treatment* consists of the prevention of re-infection by methods previously mentioned and taking a combination of iron, quinine and arsenic for some months.

(2) *Comatose Form.* These cases form one of the most fatal types of the disease. Quinine must be freely used and in large doses. *A hypodermic injection of 30 grains of quinine hydrobromide should be given at once and followed by hypodermics of smaller doses (15 grs.) every 3 to 6 hours.* Intravenous injections and transfusions of quinine have been used in this type of the disease by some observers but will not be found as practical for general use as intramuscular injection.



tions. Cinchonism must be maintained for several days. The hypodermics may be discontinued with the improvement of the patient and quinine administered by mouth. If possible administer 2 or 3 drops of croton oil in olive oil by mouth and if impossible, give the patient an enema composed of Epsom salts 2 ounces, glycerine 2 ounces and warm water 4 ounces. If the patient is full blooded, with a bounding pulse and cyanosed, a venesection and removal of 6 to 8 ounces of blood may do much good. An ice bag should be kept constantly applied to the head and hot water bottles to the feet. Hypodermoclysis of warm deci-normal salt solution may be used and hypodermics of strychnia, atropine, camphorated oil, etc., employed to tide the patient over the critical period. Rectal feeding may be resorted to later if necessary and the after treatment consists of the prevention of re-infection by methods previously described and taking a tonic composed of iron, arsenic and quinine for some months.

(3) *Hemorrhagic Form.* Other names for this affection are Malarial Hematuria, Malarial Hemaglobinuria, Black Water Fever, etc. It is always a very dangerous condition and is seldom seen, except in people who have resided in a malarial locality for a long time, say from 2 to 10 years and upwards, and who have been subject to repeated attacks of the disease, and perhaps improperly treated for the same. Much discussion has arisen about the use of quinine in this condition, some physicians holding that quinine *causes* hematuria

and h maglobinuria, and many that it aggravates it. Others, however, use it in full doses throughout their cases. Some years ago, H. A. Hare, acting for the *Therapeutic Gazette*, wrote to a large number of southern physicans. residing in malarial districts, where the mortality from malaria was very heavy, asking them to give their method of treating this condition. *A large majority absolutely condemned the use of quinine in any form in this condition*, claiming that it nearly always made the cases worse or caused a re-appearance of the hematuria if it had subsided. A number of drugs were recommended by them in treatment, the majority favoring calomel in full doses followed by sodium hyposulphite in  $\frac{1}{2}$  to 1 dram doses every three or four hours, to maintain the elimination. Some used ergot and others turpentine to control the renal hemorrhage. Some liked to give small doses of the tincture of iron or tincture of iron and arsenic. *The following treatment may be pursued in this class of cases:*

(a) The patient must be put to bed immediately and kept there and placed on a liquid diet, milk being preferred. Hot applications may be applied over the kidneys every 3 or 4 hours or they may be dry cupped to relieve the renal congestion. If the fever is high, an ice bag should be kept applied to the head and tepid sponge baths, followed by friction, given every 2 or 3 hours as required. The patient should be given 1 or 2 grain doses of calomel and soda every hour until 8 or 10 doses have been taken or the bowels have moved freely



and it should be followed up by Epsom salts or a Seidlitz Powder the next morning if necessary. If the bowels *then* fail to move, an enema of castile soap and warm water or of Epsom salts 2 ounces, glycerine 2 ounces, water (warm) 4 ounces, may be given. *Keep up the elimination* by giving  $\frac{1}{2}$  to 1 dram doses of sodium hyposulphite or magnesium sulphate in cinnamon or peppermint water 4, or 5 times a day. Give 15 grain doses of citrate of potash in water also 4 or 5 times a day, to render the urine bland and non-irritating. Water and lemonade are to be freely given.

(b) *In cases of suppression of urine or uremia*, a hot pack may be administered by wringing a blanket out of hot water and wrapping the patient up in it and covering the same with other blankets. In a short time a profuse perspiration sets in and later he may be taken out, wiped dry and covered with dry blankets. An ice bag should be kept applied to the head during the hot pack, especially if the patient has much fever. Hot normal salt solution should be administered both subcutaneously and per rectum. Give the patient half a dram of the acetate of potash in half an ounce of the infusion of digitalis every two or three hours until the kidneys act freely again and also administer saline purgatives if the bowels are not already moving freely.

(c) *Heart Failure* is to be combated by hypodermics of 1-20 of a grain of strychnia every two hours, camphorated oil, caffeine, etc., and the administration of the aromatic

spirits of ammonia internally. A pint of hot normal salt solution containing 10 drops of adrenalin chloride solution (1 in 1,000) should be given subcutaneously and repeated later if necessary.

(d) *Nausea and vomiting* are best controlled by administering cracked ice, bismuth subnitrate or oxalate of cerium combined with  $\frac{1}{4}$  grain doses of carbolic acid, 1-10 grain doses of cocaine hydrochloride or 1-10 grain doses of menthol and giving the stomach as much rest as possible. A sinapism may also be applied to the epigastrium.

(e) *Hiccough* may be a serious thing at times and is to be combated by the administration of sedatives, such as bromides, musk, valerian, compound spirits of ether, etc. A hypodermic injection of morphine sulphate gr.  $\frac{1}{4}$  combined with hyoscinae hydrobromate gr. 1-100 may be tried.

(f) *Nervous Disturbances and insomnia* are best met by bromides and hypodermics of codeine or morphine.

(g) *Rectal feeding* should be resorted to if necessary, using 1 or 2 ounces of malted milk dissolved in 4 to 6 ounces of warm water or 1 ounce of Liquid Beef Peptonoids in 2 to 4 ounces of warm normal salt solution twice a day.

(h) *Quinine* has no place in the therapy of this affection and during the persistence of the hematuria *must not be used at all*. After the urine has *cleared up entirely*, if the chills and fever recur and a microscopical examination of the blood reveals the presence of the



plasmodium, then quinine may be given in moderate doses or Warburg's tincture, salicin or Methylene Blue may be given and they must be accompanied by full doses of Fowler's solution of arsenic.

(i) *After Treatment* consists of the prevention of re-infection by methods previously described or the removal of the patient from the infected region and the administration of iron, arsenic and small doses of quinine for some months.

#### MALARIAL ANEMIA AND CACHEXIA.

The *Anemia* requires the prolonged administration of iron, quinine and arsenic with tonic laxatives, such as cascara sagrada, aloes, etc., to keep up the elimination, and a liberal diet. The *cachexia* is to be combated by much the same means recommended in chronic malaria. The administration of Warburg's tincture in doses of 2 drams in capsules 3 or 4 times a day or Fowler's solution of arsenic given in ascending doses, well diluted with water or as recommended by Ander's cinchonidine sulphate in daily doses of 30 grains. The elimination should be promoted by 1 or 2 dram doses of sodium phosphate, in a glass of hot water taken in the morning before breakfast if constipated, or other laxative drugs such as podophyllin, aloes or cascara sagrada may be given. Hot vapor or steam baths are also of value. The removal to a climate free from malaria and, later in the case, giving a thorough course of iron, arsenic and quinine, will complete the cure.









